To: Wands, James[James.Wands@hdrinc.com]
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From: Peter Israelsson
Sent: Mon 9/23/2013 10:57:47 PM
Subject: Lower Passaic River - 2378-TCDD surface mapping kriging sensitivity files
surf_TCDD_2010_Kriging_sensitivity_results_LPR_20130923.zip

James –

I am also transmitting an alternate 2,3,7,8-TCDD mapping for the 2010 dataset that was created as part of an evaluation of alternate interpolation approaches, which will be discussed at the Thursday meeting. This is not intended to be an updated map, but rather a sensitivity which provides some insight into how Thiessen polygons compare with a geostatistical approach that yields a smoother surface. The Kriged results are provided in the attached zip file, surf_TCDD_2010_Kriging_sensitivity_results_LPR_20130923.zip.

Some of the details of the Kriging approach employed are provided below (also included in the zip file), though exhaustive detail is not provided since it is presented as a sensitivity. We can provide additional detail if needed, or we can discuss at the meeting.

Regards,

Peter

Transmittal Notes - Kriging Sensitivity for LPR 2,3,7,8-TCDD Surface Sediment Concentration Mapping

- The previously defined groups were divided into longitudinal bins to yield roughly constant means (i.e., to remove the large scale longitudinal trend in the data), while preserving data density and using geomorphical breakpoints where possible. The initial bins developed for this sensitivity are outlined in the table below (from Bin_groups_20130923_LPR.xlsx), and are shown in the shapefile Group_RM_bins_for_kriging_20130923_LPR.shp. The bin boundaries

may be subject to additional refinement if further effort is spent on Kriging methods.

- Ordinary point Kriging was performed separately for each group / longitudinal bin using the geoR package for R; the interpolation was performed in log-space using a straightened-river variogram developed from the LPR surface sediment dataset.

- Results were back-transformed via simple exponentiation of the Kriged field. This corresponds to back-transforming the median (50^{th} percentile).

- The Kriging results were then mapped back to the original Cartesian coordinates, and the individual interpolations for the groups/bins were combined. No smoothing at bin boundaries has been performed; such refinements were deferred for this sensitivity.

- Results for the Kriged field are contained in shapefile Kriging_TCDD_2010_20130923_LPR.shp

Longitudinal Bins and Groups Used for the Kriging Sensitivity of 2,3,7,8-TCDD Surface Sediment Concentration Mapping

Group Description	Group Number	Longitudinal Bin Name	Bin Downstream Bound (River Mile)
Channel - No historical deposition	2	G2	N/A*
Channel - Little to moderate historical deposition; ≥1ft erosion 1995 to 2012	3a	G3a	N/A*
Channel - Little to moderate historical deposition; <1ft erosion 1995 to 2012	3b	G3b	N/A*
Channel - High historical deposition	4	G4	N/A*
Left Shoal	1	LS_D	0.0
Left Shoal	1	LS_E	2.5
Left Shoal	1	LS_F	3.6
Left Shoal	1	LS_G	5.3
Left Shoal	1	LS_H	6.6
Left Shoal	1	LS_I	8.5
Left Shoal	1	LS_J	13.0
Right Shoal	1	RS_D	0.0
Right Shoal	1	RS_E	2.5
Right Shoal	1	RS_F	6.6
Right Shoal	1	RS_G	8.5
Right Shoal	1	RS_H	11.0
Right Shoal	1	RS_I	11.9
Silt	NA	SI_A	7.5
Silt	NA	SI_B	8.2
Silt	NA	SI_C	10.1
Silt	NA	SI_D	14.5
Non-shoal upstream	NA	NS_A	7.5
Non-shoal upstream	NA	NS_B	9.6
Non-shoal upstream	NA	NS_C	11.9
Non-shoal upstream	NA	NS_D	13.0
Non-shoal upstream	NA	NS_E	14.0
Non-shoal upstream	NA	NS_F	14.3

* Groups 2, 3a, 3b, and 4 were not sub-divided longitudinally for purposes of Kriging. These groups collectively cover the interval RM 0 to RM 7.5.

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